The Road Inventory
of
Sweetwater Marsh National Wildlife Refuge
Chula Vista, California

Prepared By:
Federal Highway Administration
Central Federal Lands Highway Division
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CONTENTS

INTRODUCTION

The Transportation Equity Act for the 21st Century (Public Law 105-178) created the Refuge Roads Program. Refuge roads are those public roads that provide access to or within a unit of the National Wildlife Refuge System and for which title and maintenance responsibility is vested in the United States Government. Funds from the Highway Trust Fund are available for refuge roads and can be used by the station to pay the cost of:

(a) Maintenance and improvements of refuge roads.
(b) Maintenance and improvements of:
    (1) Adjacent vehicle parking areas
    (2) Provision for pedestrians and bicycles and
    (3) Construction and reconstruction of roadside rest areas that are located in or adjacent to wildlife refuges
(c) Administrative costs associated with such maintenance and improvements.

The funds available for refuge roads are to be disbursed based on the relative needs of the various refuges in the National Wildlife Refuge System, and taking into consideration:

(a) The comprehensive conservation plan for each refuge;
(b) The need for access as identified through land use planning; and
(c) The impact of land use planning on existing transportation facilities.

To determine the relative needs of the U.S. Fish and Wildlife Service, the Federal Highway Administration (FHWA) was asked to inventory all public access roads and parking lots and provide a condition assessment of each. An FHWA representative meets with refuge personnel to identify route segments and assign route numbers and functional classifications for each route. All segments (roads and parking lots) are mapped using Trimble GPS units and visually assessed for condition using the RSL method of evaluation developed at Utah State University.

During the inspection process, the FHWA assesses the following:

<u>Asphalt Surfaces</u>

- Fatigue Cracking
- Longitudinal Cracking
- Transverse Cracking
- Block Cracking
- Edge Cracking
- Patching
- Potholes
- Rutting
- Roughness
- Drainage

Concrete Surfaces

- Spalling of Joints
- Joint Seal Damage
- Corner Breaks
- Broken Slabs
- Faulting
- Longitudinal Cracking
- Transverse Cracking
- Patch Deterioration
- Map Cracking

Unpaved Surfaces

- Surface Type:
  - Gravel
  - Native
- Template Characteristics:
  - Cross Section (Crown)
  - Roadside Drainage
- Surface Deformations:
  - Corrugations (Wash Boarding)
  - Potholes
  - Rutting
- Surface Defects:
  - Dust
  - Loose Aggregate (gravel only)

Each of the above items is assigned a value ranging from 0 (excellent condition) to 9 (failed) based on the visual assessment by FHWA while in the field (pages 11-5 through 11-9 contain a more detailed explanation of the rating system). An estimate is provided, in year 2006 dollars, to upgrade each route to excellent condition. This estimate is based upon data calculated by state, and may have some regional variation due to local conditions and should be evaluated on a case-by-case basis when being used for programming purposes.

In addition to this report, the FHWA will furnish the condition ratings of each route and segment to the Fish and Wildlife Service in a Microsoft Access database so the data can be included in their Real Property Inventory.

Sweetwater Marsh NWR

Summaries

Route Miles and Percentages by Functional Class and Condition

F. C.	Condition Rating (Based on RSL)*										TOTAL MILES
	Excellent		Good		Fair		Poor		Failed		
	MILES	%	MILES	%	MILES	%	MILES	%	MILES	%	
I											
II			0.73	100%							0.73
III											
IV											
V											
Totals			**0.73**	**100%**							**0.73**

Functional Class IV and V roads are not being rated at this time. Only roads with public access.

*For a description of condition ratings for the various surface types see pages 12-8 and 12-9

Route Miles and Percentages by Surface Type and Condition

S. T.	Paved Condition Rating [Condition(RSL)]										TOTAL MILES
	Excellent (19-20)		Good (13-18)		Fair (7-12)		Poor (1-6)		Failed (0)		
	MILES	%	MILES	%	MILES	%	MILES	%	MILES	%	
AS			0.73	100%							0.73
CO											
Totals			**0.73**	**100%**							**0.73**

S. T.	Unpaved Condition Rating [Condition(RSL)]										TOTAL MILES
	Excellent (8-10)		Good (5-7)		Fair (3-4)		Poor (1-2)		Failed (0)		
	MILES	%	MILES	%	MILES	%	MILES	%	MILES	%	
GR											
NA											
Totals											

Square Footage (Parking Areas)

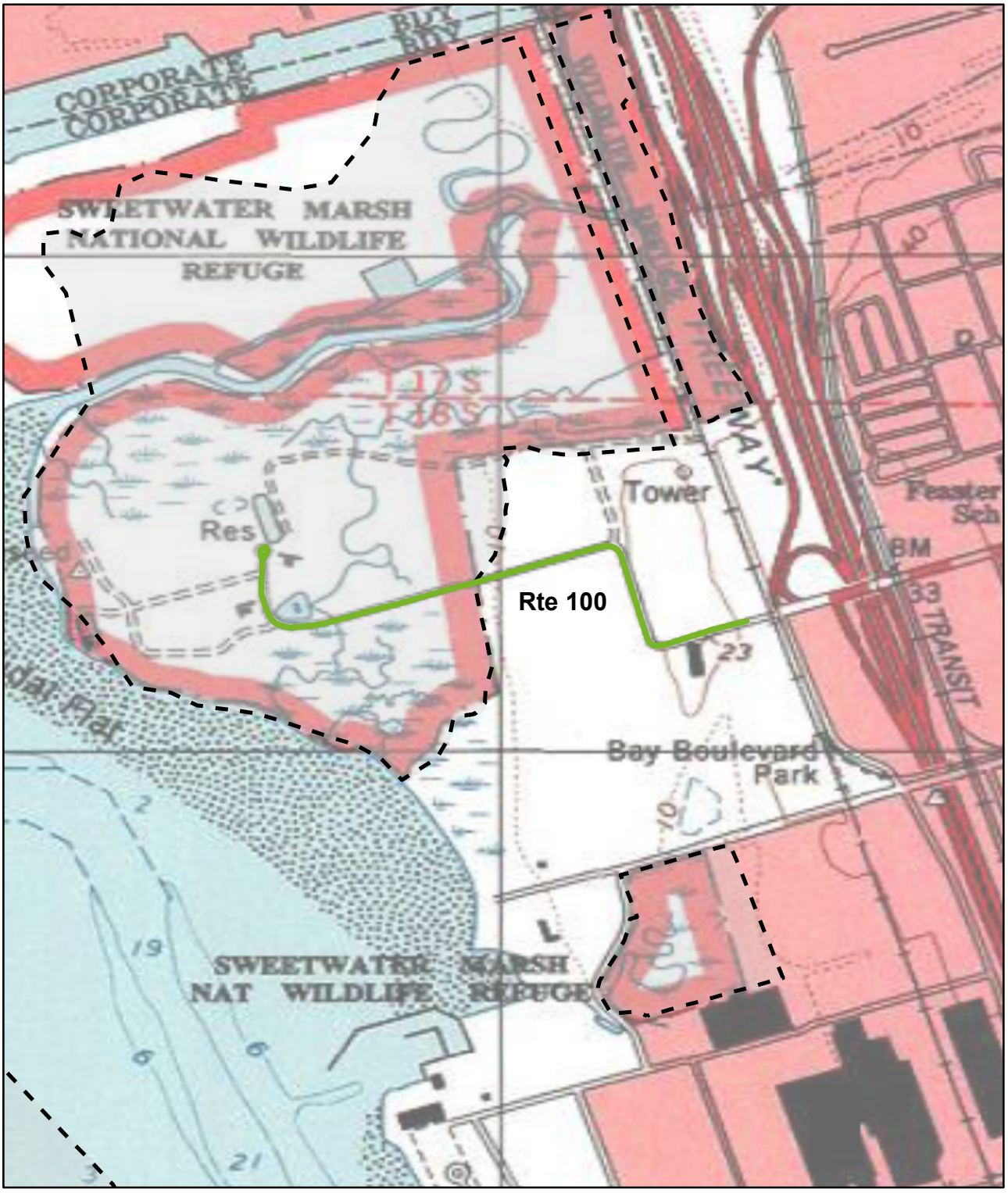
S. T.	Condition Rating										Total Square Feet
	Excellent		Good		Fair		Poor		Failed		
	Square Feet	%	Square Feet	%	Square Feet	%	Square Feet	%	Square Feet	%	
AS											
CO											
GR											
NA											
Totals											

Sweetwater Marsh NWR
Summaries

Road and Parking Repair Costs

		Good	Fair	Poor	Failed
Concrete	**Cost (Sq.Yd.)**	$1.23	$7.38	$123.00	$246.00
	Treatments	Joint Sealing	Pressure relief joints, minor grinding, minor joint repair	Partial to full depth repairs, slab stabilization, grinding, overlay	Reconstruction
Asphalt	**Cost (Sq.Yd.)**	$1.23	$6.15	$61.50	$196.80
	Treatments	Routine Maint (Crack Seal, Cold Patch, Hot Patch, Fog Coat)	Crack and chip seal	Pavement rehabilitation	Reconstruction
Gravel	**Cost (Sq.Yd.)**	$0.28	$3.69	$9.84	$18.45
	Treatments	Routine Maint (Regrading, blade and maintain crown, shoulder maintenance)	Gravel spot replacement, spot crown reestablishment	Re-gravel (6")	Reconstruction
Native	**Cost (Sq.Yd.)**	$0.18	$0.95	$3.69	$6.15
	Treatments	Routine Maint (Regrading, blade and maintain crown, shoulder maintenance)	Spot crown reestablishment, pull ditches	Reshape roadway, drainage	Reconstruction

SWEETWATER MARSH NATIONAL WILDLIFE REFUGE ROUTE LOCATION MAP



Sweetwater Marsh NWR - 81682 - ROUTE IDENTIFICATION LIST (NUMERIC)

Shading Color Key:	White = Paved Routes
	Yellow = Unpaved Routes

RTE #	ROUTE NAME	RTE MI	ROUTE DESCRIPTION	PAVED MI	UN-PAVED MI	LANES	FUNC. CLASS
100	Gunpowder Point Drive	0.73	From Gate, to End of route	0.73	-	2	2

Sweetwater Marsh NWR - 81682 - ROUTE IDENTIFICATION LIST (PARKING)

Shading Color Key:	Green = Unpaved Parking Lots
	Blue = Paved Parking Lots

RTE #	ROUTE NAME	RTE SQFT	ROUTE DESCRIPTION	PAVED SQFT	UN-PAVED SQFT

NO ROUTES TO REPORT

CHANGES TO THE FISH AND WILDLIFE SERVICE ROAD INVENTORY REPORT
Sweetwater Marsh NWR - 81682

Routes added to previous inventory: No routes added to previous inventory.

Rte #	Rte Name

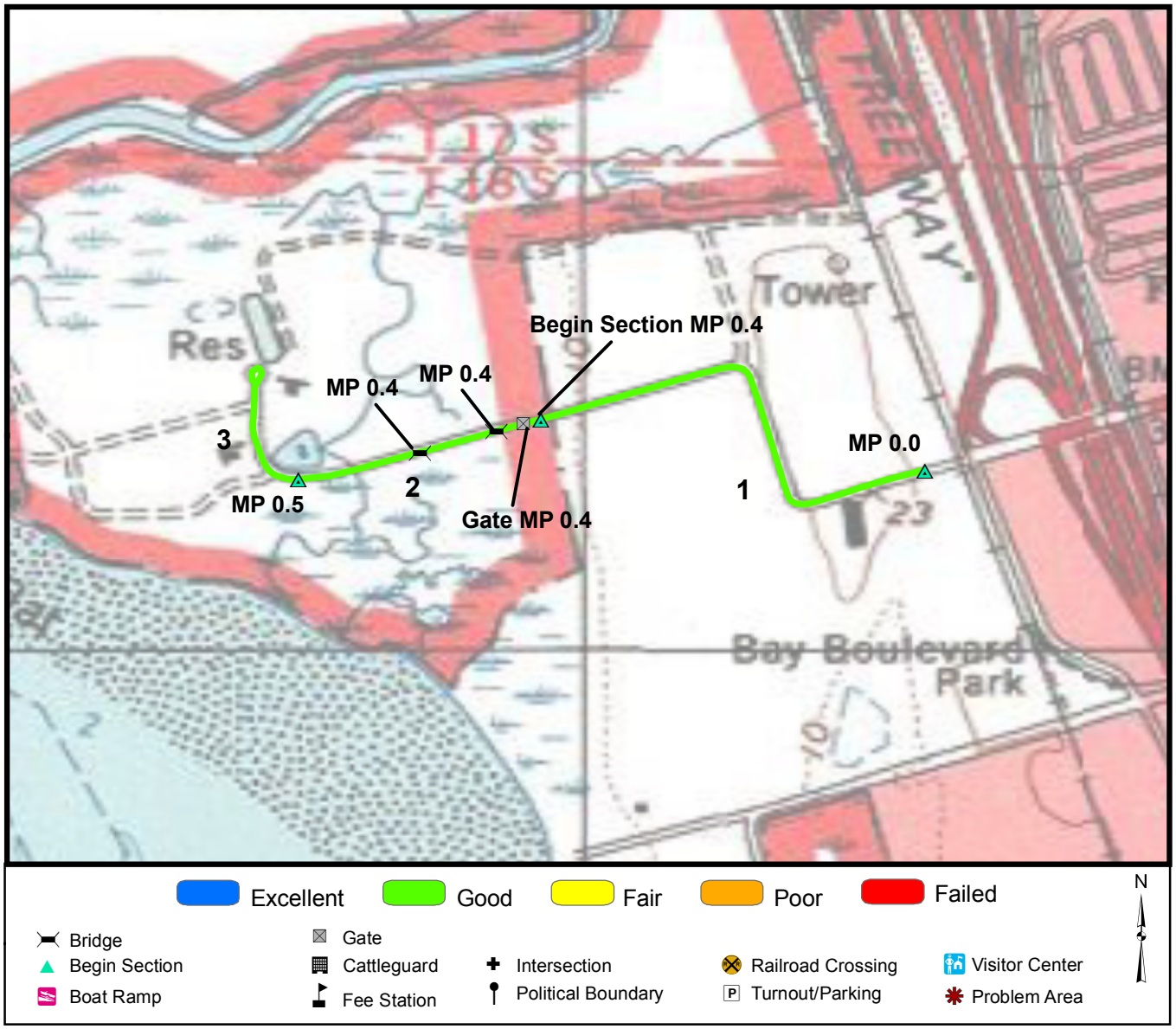
Routes removed from previous inventory:

	Rte #	Rte Name		
1.	900	Chula Vista Interpretive Center Parking	Rte Desc:	From Gunpowder Point Dr, north into parking at Refuge sign/greenhouse
			Reason for Removal:	Not open to public

Routes modified from previous inventory: No routes modified from previous inventory.

Rte #	Rte Name

Comments:



1 inch equals 800 feet

Region 8
Sweetwater Marsh NWR

ROUTE: 100 Gunpowder Point Drive TOTAL LENGTH: 0.73 Miles

Section Number	001	002	003		
Section Length (miles)	0.40	0.19	0.14		
Rating Date	1/22/2007	1/22/2007	1/22/2007		
Section Information					
Surface Type	Asphalt	Asphalt	Asphalt		
Terrain	Level	Level	Level		
Number of Lanes	2	1	1		
Roadway Width (feet)	22	13	13		
Roadway Condition Information					
Condition	Good	Good	Good		
Remaining Service Life (years)	14	14	14		
Cost Estimate	$6350	$1782	$1313		

Section VI. Parking Lot Condition Summary Sheets

Description:

The following pages contain the parking lot information for this station. These pages contain the following items:

- Station Name

- Route Number. Parking lot route numbers start at **900**.

- Parking Lot Name.

- Parking Lot description and location.

- Information Chart. This chart contains all pertinent information regarding this parking lot, including the date surveyed, surface type, cost to improve (costs of less than $500.00 for an individual parking lot indicate no maintenance is necessary and have been omitted from the report and database), the area in square feet, and the overall condition.

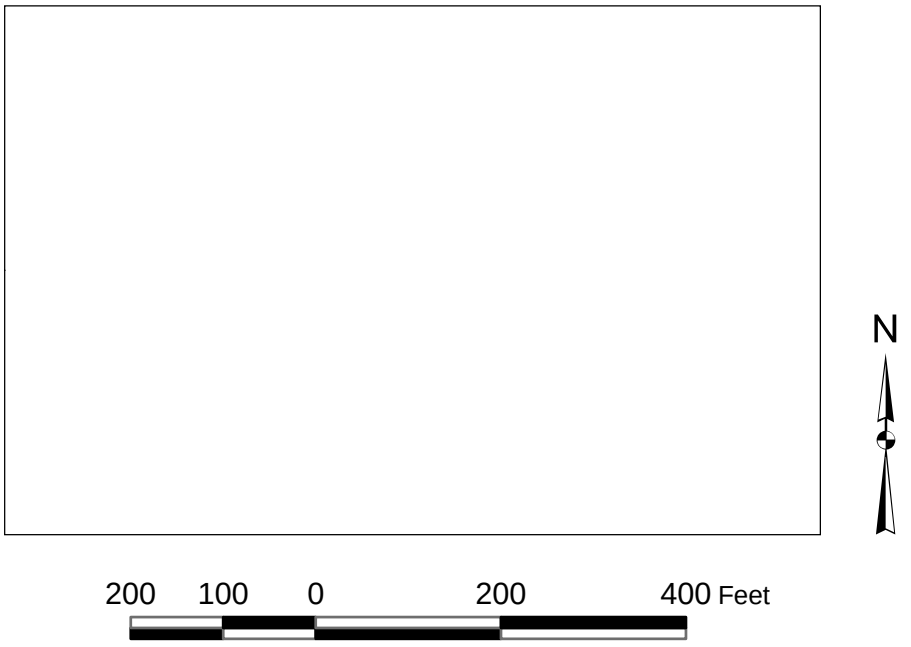
- The body of the page depicts the shape of the parking lot, representing the perimeter. At least one photograph of the parking lot is displayed.

- A scalebar for the parking lot shape, and a north arrow.

Sweetwater Marsh NWR

Route	State	Date Visited	Surface Type	Area (sq ft)	Condition	Cost to Improve

NO ROUTES TO REPORT



Sweetwater Marsh NWR Bridge Inventory

Rte #	Milepost	NBIS #	Sufficiency Rating	Functionally Obsolete	Structurally Deficient
100	0.4	NA	NA	NA	NA
100	0.4	NA	NA	NA	NA

PHOTOGRAPHIC SHEET

ROUTE NUMBER: 100
STATION: Sweetwater Marsh NWR
DATE:01/22/2007

Photo # 2112 - MP 0.0 - Begin Route at Gate

ROUTE NUMBER: 100
STATION: Sweetwater Marsh NWR
DATE: 01/22/2007

Photo # 2113 - MP 0.4 - Begin Section 002

PHOTOGRAPHIC SHEET

ROUTE NUMBER: 100
STATION: Sweetwater Marsh NWR
DATE: 07/20/2001

Photo # 1868 - MP 0.4 - Bridge

ROUTE NUMBER: 100
STATION: Sweetwater Marsh NWR
DATE: 01/22/2007

Photo # 2114 - MP 0.5 - Begin Section 003

PHOTOGRAPHIC SHEET

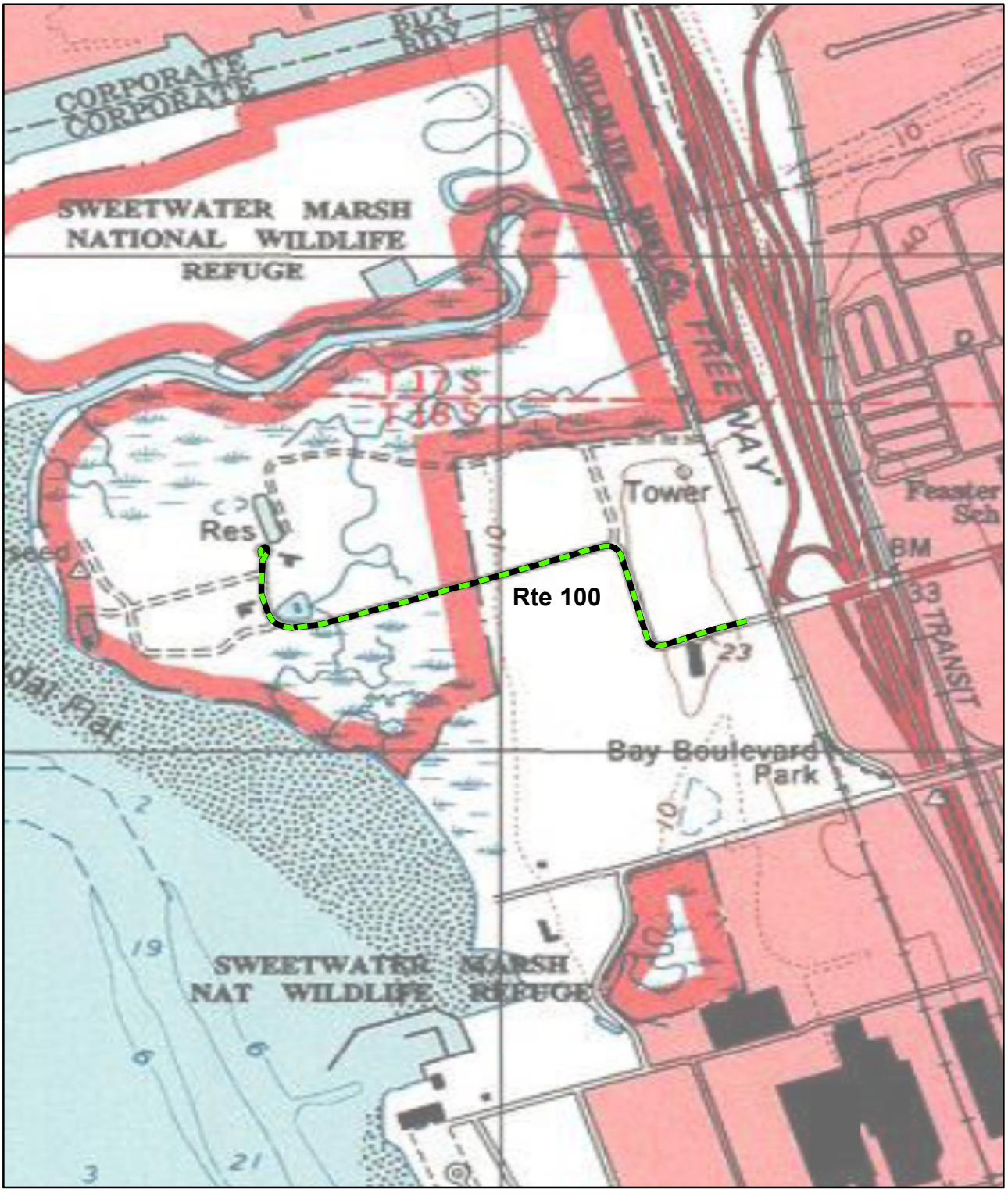
ROUTE NUMBER: 100
STATION: Sweetwater Marsh NWR
DATE: 07/20/2001

Photo # 1870 - MP 0.4 - Bridge

Sweetwater Marsh NWR - 81682 - Pavement Management System

Seg ID	Road Name	Route Number	Section Number	SAMMS Number	From	To	Length (mi)	Area (yd^2)	Surface Type	RSL (Yrs)	Date of Survey	Condition	Estimated Cost ($)
1	Gunpowder Point Drive	100	001		Gate	Sec 002	0.40	5163	Asphalt	14	1/22/07	Good	6350.08
2	Gunpowder Point Drive	100	002		Sec 001	Sec 003	0.19	1449	Asphalt	14	1/22/07	Good	1782.35
3	Gunpowder Point Drive	100	003		Sec 002	End of route	0.14	1068	Asphalt	14	1/22/07	Good	1313.31

SWEETWATER MARSH NATIONAL WILDLIFE REFUGE REMAINING SERVICE LIFE (YEARS)



Paved Sections

- 0
- 1-6
- 7-12
- 13-18
- 19-20

0.2 0.1 0 0.2 0.4 Miles

Sweetwater Marsh NWR
Accident Summary

Number of Accidents Reported	Timespan of Accidents	Injuries	Fatalities
0	No Accidents Reported	0	0

GLOSSARY OF TERMS
AND
ABBREVIATIONS

TERM OR ABBREVIATION	DESCRIPTION OR DEFINITION
81682	Sweetwater Marsh NWR Organization Code
ADT	Average daily traffic. Average daily traffic for the period comprising 80% of annual visitation.
Asphalt (AS)	Paved Bituminous Asphalt Concrete surface.
BIA	Bureau of Indian Affairs
Concrete (CO)	Paved Concrete surface.
Condition Rating	Roadway condition rating. Numerical rating from 0 to 10 (excellent). Based on the surface condition of the road.
CRS	Condition Rating Sheet. Index rating for pavement distresses, roadway condition and cross-section information.
EXCELLENT	Excellent rating. 19-20 RSL for paved surfaces, or 8-10 for unpa ved surfaces
FAIL	Failed Rating. 0 RSL
FAIR	Fair rating. 7-12 RSL for paved surfaces, or 3-4 RSL for unpaved surfaces
F. C.	Functional Class
FHWA	Federal Highway Administration
Func. Class	Functional Class. See Table 1 in appendix.
FWS	Fish and Wildlife Service

GOOD	Good rating. 13-18 RSL for paved surfaces, or 5-7 RSL for unpaved surfaces
GPS	Global Positioning System
Gravel (GR)	Unpaved, graded gravel surface.
Lane	The portion of roadway from centerline to fogline or edge of roadway if no fog line exists.
Lane Miles	Mileage of total pavement coverage, based on a standard lane width. Either calculated as straight route mileage times the number of lanes, or as an area converted to 11 foot lane widths.
MP	Milepost
N/A	Not applicable.
Native (NA)	Unpaved, native surface roadway, typically dirt or grass.
NFH	National Fish Hatchery
NWR	National Wildlife Refuge
PASER	Pavement Surface Evaluation and Rating
PMS	Pavement Management System
POOR	Poor rating. Condition Rating between 1-6 RSL for paved surfaces, or 1-2 RSL for unpaved surfaces
Region	FWS Region in which the refuge is located.
Roadway Width	The entire portion of roadway from edge to edge.
RSL	Remaining Service Life (Years) of a road segment.
RTE #	Route number.

RTE MI	Total route length in miles.
SMS	Sign Management System
S. T.	Surface Type
Unpaved	Road or Parking lot without asphalt or concrete surface
WMD	Wetlands Management District
WPA	Waterfowl Production Area

GENERAL FWS ROAD FUNCTIONAL CLASSIFICATION - TABLE 1

Class I	Principal Refuge Road (Public Roads) - Roads which constitute the main access route, main auto tour route, or thoroughfare for refuge visitors. Route Numbers 10-99.
Class II	Connector Refuge Road (Public Roads) - Roads which provide access within a refuge to areas of scenic, scientific, recreational or cultural interest, such as overlooks, campgrounds, education centers, etc. Route Numbers 100-199.
Class III	Special Purpose Refuge Road (Public Roads) - Roads which provide circulation within public concessionaire facilities. Also roads that are used as public access, but are not designated as such. Route Numbers 200-299
Class IV	Administrative Access Road (Administrative Roads) - All public roads intended for access to administrative developments or structures such as refuge offices, employee quarters, or utility areas. These roads have restricted access. Route Numbers 400-499.
Class V	Restricted Road (Administrative Roads) - All roads normally closed to the public, including patrol roads and special use permit (such as hunting) roads. These roads are considered administrative roads, even though they may occasionally be open to the public. Route Numbers 400-499.

A refuge road system contains those roads within or giving access to a refuge or other unit of the FWS which are administered by the FWS, or by the Service in cooperation with other agencies. The assignment of a functional classification (FC) to a refuge road is not based on traffic volumes or design speed, but on the intended use or function of that road or route.

DESCRIPTION OF RATING SYSTEM

Rating Data is collected on four different surface types: Asphalt, Concrete, Gravel, and Native. The Utah LTAP Center's Remaining Service Life (RSL) system is used for all surface types. The RSL system is based on the Strategic Highway Research Program's (SHRP) Distress Identification Manual.

Asphalt Rating System

Data is collected on the following distresses and conditions:

- **Fatigue Cracking** - Interconnected cracks forming small irregular shapes.
- **Longitudinal Cracking** - Cracks running parallel with the roadway, in the direction of traffic.
- **Transverse Cracking** - Cracks perpendicular to the roadway, going across the lane or lanes.
- **Block Cracking** - Interconnected cracks forming large blocks.
- **Edge Cracking** – Cracks running along the edge of the pavement surface.
- **Patches** - Original surface repaired with new asphalt patch material.
- **Potholes** - Holes or depressions in the pavement.
- **Rutting** - surface depressions in the wheel paths.
- **Roughness –** Evenness of pavement for serviceability.
- **Drainage** – Ability of the road surface to drain water based on proper slope.

A Condition Rating value is calculated for each homogenous pavement section, and can be up to 1 mile in length.

Rating Index Formula

Fatigue, longitudinal, transverse, block, and edge cracking, along with patching and potholes are rated on a 0 - 9 scale (0 = no distress, 9 = maximum distress). The rating given is based on the extent and the severity of the distress. Rutting, roughness, and drainage are rated on a 0 - 3 scale (0 = excellent, 3 = poor). Each distress type has given Remaining Service Life (RSL) values (in years) based on the rating for that particular distress. The distress with the rating resulting in the lowest RSL value is considered to be the governing distress. That value is then assigned as the RSL of the road segment.

Concrete Rating System

Data is collected on the following distresses and conditions:

- **Spalling of Joints** – Chipping, breaking, or cracking of slab edges
- **Joint Seal Damage** – Any damage or condition that enables materials or water to infiltrate into the joint from the surface.
- **Corner Breaks** – A portion of the slab separated by a crack that intersects the adjacent transverse and longitudinal joints, forming approximately a 45° angle to the direction.
- **Broken Slabs** – Faulting and/or cracking localized to individual slabs.
- **Faulting** – Difference in elevation across a crack or joint.
- **Longitudinal Cracking** – Cracks in the pavement running parallel to the direction of traffic.
- **Transverse Cracking** - Cracks in the pavement running perpendicular to the direction of traffic.
- **Patch Deterioration** – Faulting, settling, or cracking of previously placed patch
- **Map Cracking** – A series of cracks that extend only into the upper surface of the slab

A Condition Rating value is calculated for each homogenous pavement section, and can be up to 1 mile in length.

Rating Index Formula

The rating procedure for concrete pavement is the same as that for asphalt pavement described previously. Each of the distresses described above are rated on the same 0 – 9 scale. The governing distress is then determined and the RSL associated with that distress is assigned to the road segment.

Gravel and Native Rating System

Data is collected on the following distresses and conditions:

- **Cross Section (Crown)** - Roadway built so that the center is higher than the shoulder, to prevent water from pooling on roadway.

- **Roadside Drainage** - Roadside ditches and culverts to handle water flow and prevent pooling on the roadside.

- **Corrugations (Washboarding)** - Small trenches or holes developing perpendicular to the roadway.

- **Potholes** - Holes or depressions in the roadway.

- **Rutting** - Depressions running parallel with the roadway, in the wheelpaths.

- **Dust** - Amount of dust caused by traffic.

- **Loose Aggregate (Gravel Only)** - Loose gravel, typically piled up on the roadway edges or centerline.

A Condition Rating value is calculated for each homogenous pavement section, and can be up to 1 mile in length.

Rating Index Formula

The rating procedure for unpaved roads is the same as that for asphalt and concrete pavements described previously. Of the distresses described above, corrugations, potholes, rutting, and loose aggregate are rated on the same 0 – 9 scale previously mentioned. Cross section, roadside drainage, and dust are rated on the same 0 – 3 scale described for asphalt pavement. The governing distress is then determined and the RSL associated with that distress is assigned to the road segment.

Condition Descriptions by Surface Type

The following definitions are used to describe pavement condition for the various surface types. These are general guidelines for condition indications.

Asphalt

Excellent – Recently constructed or overlaid road where construction or overlay was performed correctly- No maintenance required. RSL = 19-20 years.

Good – Low extent longitudinal and transverse cracks. All cracks are 1/4" or less with little or no crack erosion. Patches are in good condition and applied correctly. Routine Maintenance recommended. RSL = 13-18 years.

Fair - Roads are in good structural condition with little or no fatigue cracking. Longitudinal, transverse, and edge cracking is at medium extent and severity. Block cracking is not extensive. Any patches are in good condition. Preventative maintenance recommended. RSL = 7-12 years.

Poor - Road beginning to show signs of structural distress. Fatigue cracking is medium to high extent and medium severity. Cracking will be severe. Surface may have severe block cracking and show. Patches are in fair to poor condition. There is moderate distortion or rutting and occasional potholes. Rehabilitation recommended. RSL = 1-6 years.

Failed - Road is severely deteriorated. Signs of structural failure appear along with severe and extensive fatigue cracking, distortion, potholes, or extensive patches in poor condition. Reconstruction recommended. RSL = 0 years.

Concrete

Excellent - New pavement. No maintenance required. RSL = 19-20 years

Good - First signs of transverse cracking, patch or repair, more extensive pop-outs, or scaling. Sealing or routine maintenance recommended. RSL = 13-18 years.

Fair – Pavement has join or crack spalling, and/or faulting, along with cracking at corners with broken pieces. Any Patches are in fair condition and faulting is at a minimum. Preventative maintenance recommended. RSL = 7-12 years.

Poor - Joints and cracks are open 1 inch, spalled, or patched. Faulting is more severe. Rehabilitation recommended. RSL = 1-6 years.

Failed - Most slabs have failed structurally, and faulting is severe. Reconstruction recommended. RSL = 0 years.

The following table shows the RSL values for asphalt and concrete pavements in terms of excellent, good, fair, poor, and failed condition.

SUBJECTIVE CONDITION RATING FOR REMAINING SERVICE LIFE (Asphalt and Concrete Pavements)								
	FAILED	POOR		FAIR		GOOD		EXCELLENT
RSL Years	0	1-3	4-6	7-9	10-12	13-15	16-18	19-20

Gravel and Native

Note - Native surfaces do not have a gravel layer.

Excellent - Newly constructed road that has been constructed properly with proper crown, drainage and gravel layer. Little or no distress. No maintenance recommended. RSL = 8-10 years.

Good - Crown, drainage provisions, and gravel layer are in good condition. Distress limited to traffic effects such as dust, loose aggregate, and low severity corrugations (wash boarding). RSL = 5-7 years.

Fair - Adequate drainage and crown through majority of roadway. Crown repair, ditch improvement may be necessary. Road has more severe corrugations and potholes. Preventative maintenance recommended. RSL = 3-4 years.

Poor - Travel at slow speeds is necessary. Additional gravel layer needed to carry traffic. Poor crown. Ditching is inadequate and rutting is extensive and severe. Rehabilitation recommended. RSL = 1-2 years.

Failed - Travel is difficult, and road may be closed at times. Rutting and Corrugations are very severe. Total Reconstruction of road is recommended. RSL = 0 years.

The following table shows the RSL values for gravel and native roads in terms of excellent, good, fair, poor, and failed condition.

SUBJECTIVE CONDITION RATING FOR REMAINING SERVICE LIFE (Unpaved - Gravel and Native roads)					
	FAILED	POOR	FAIR	GOOD	EXCELLENT
RSL Years	0	1-2	3-4	5-7	8-10